Conditioned Emotional Responses

by John B. Watson and Rosalie Rayner

John Broadus Watson was an American psychologist who is considered the father of the Behaviorist Theory. Watson is ranked as the 17th most cited psychologist of the 20th century, who alongside with his student Rosalie Rayner goes on to experimentally establish the behaviorist view that behavior is generated in a person through external stimuli in his paper, "Conditioned Emotional Responses" first published in the Journal of Experimental Psychology, 3(1), 1-14.

It is fair to establish that most readers of this paper including me would find it to be an interesting yet surprising and detestable study given its nature, psychological experimentation on a child. In the study, the authors condition a child Albert B. aged 9 months to fear from various stimuli. This was accomplished first with a rat by striking a metal rod with a hammer behind the child as soon as the rat got close. Loud, sharp noises are known to generate a fear response in any child. Although the child was impervious to the rat prior to the noise and was found playing with it, after repeated such blows, fear-like reactions were observed upon being presented to the rat. Following this, the authors proposed that this conditioning would be transferable, and found it to be true to rat-like objects including a rabbit, a dog, a fur-coat and a mask of santa-claus. The child was observed to curiously play with all these animals and objects unassumingly prior to the studies. Next, what the sensitivity to the conditioned fear was with time was studies and the impact was observed to last after one month. As a final study step, reconditioning was to be done but this never happened as the child left the lab-settings.

Keeping the ethical line of reasoning aside, reading through the paper, the experimental evidence provided seems convincing in support of the author's theory that people are conditioned to various types of emotional response from external stimuli. It holds in accordance to what feels intuitively true that we are molded mostly kids and also as adults via experiences. And thus, it seems that in the simply framed debate of nature vs nurture, nurture triumphs. Watson quoted that, *"Give me a dozen healthy infants, well-formed, and my own special world to bring them up in, and I'll guarantee to take anyone at random and train him to become any type of specialist I might select doctor, lawyer, artist, merchant, chief, and, yes, beggarman and thief."*

But this stance lasts as long as when a second reading is performed, critically. After performing the initial conditioning with the joint stimulation with the metallic sound and rat, the authors write *"The instant the rat was shown, the baby began to cry...This was as **convincing a case** of a completely conditioned fear response as could have been theoretically pictured."*

The reasoning seems logical at first but exhibits ignorance. In fact, they develop not only their reasoning and experiments along what is logical to them, but also their text, devoid of any acknowledgement of what they might not know. They write, *"These experiments would seem to show **conclusively** that directly conditioned emotional responses as well as those conditioned by transfer persist."*

The studies in the paper do not establish extensiveness (none are referred as well), and the authors go on to establish positive correlations throughout the paper, rushing to conclude what they know and feel to hold absolutely true, with no future scopes. This is clear in as they are quick to challenge Freudian ideas and establish their own to be true. Irregardless of what was wrong with Freud's ideas, the authors exhibit self-doubt in the least.

Finally bringing the ethics into picture, the authors claim initial hesitation putting up a child against such experimentation but decided to move on *"comforting ourselves **by the reflection** that such attachments would arise anyway as soon as the child left the sheltered environment of the nursery for the rough and tumble of the home."* They further refer to the child as *"the organism"*. Although there were no established rules at the time, acting on gut feeling (unscientific) and their affinity to challenge the ideas of a leading figure brings their "initial hesitation" to doubt.

Mothering style and methylation

by Robert M. Sapolsky

Robert Morris Sapolsky is an American neuroendocrinology researcher and is currently a professor of biology, and professor of neurology and neurological sciences at Stanford University who in his journal article ”Mothering style and methylation” in Nature Neuroscience, vol 7(8) concludes that early experience is not necessarily destiny.

Sapolsky by means of referring to the findings of [3] in a simple language decrypts if the influence of parenting and early life experience becomes long lasting and how, by establishing that mothering style (high vs low lick, groom and arched-back nursing ’LG-ABN’) in rats bring about epigenetic changes.

Neonatal handling in the first few weeks of life of rats showed a lifelong increase in the number of glucocorticoid (stress harmones) receptors in the hippocampus (responsible for negative feedback regulation), leading to a tighter regulation (low circulation) of glucocorticoids (very specifically, increases in the serotonergic tone in hippocampus was seen, making the transcription factor NGFI-A binding to the receptors and thus resulting in an increased expression of the receptor). This resulted in less fearful, stress reactive adults. Same was found to be true for pups of high LG-ABN females. It was further shown that pups raised by high LG-ABN mothers became high LG-ABN parent themself, irregardless if the pup was biologically from a low LG-ABN mother. These changes becoming lifelong is attributed to and **proved** to be due to two mechanisms that cause prolonged differences in gene expressions: methylation (a methyl group attaching to a gene’s promoter and itself binding a regressor protein, effectively silencing the gene) and chromatin structure (determines how readily a TF access promoters in the DNA). Exposure to high LG-ABN mothering was shown to demythylate key sites (thus allowing NGFI-A to induce greater expression of glucocorticoid receptors long-term) and actylate the chromatin structure (decreasing their binding to DNA thus increasing access of TF to promoters). They further amazingly proved the other direction too that the two mechanisms described are directly responsible for profiles of pups attributed with high LG-ABN mothering, by using a pharmacological inhibitor of chromatin structure deacetylation, causing a rat raised in a low LG-ABN environment into one with a profile similar to pups raised in high LG-ABN.

Anyone without any prior knowledge about the field of epigenetics, such is my case would come out convinced upon reading the paper that genes impact behavior and environmental factors affect genes (changing transcription factors TF that trigger the gene to make certain proteins). We see that it is rigorously established with all experiments performed at the level of physics, that negative life-long consequences of prenatal stress experiences in rats can be reversed, by being raised by a high LG-ABN mother after birth, also by drugs to some extent. Hence, early life experience is not conclusive of who we turn out to be. And thus it is not either nature or nurture, but both go hand in hand impacting behavioral changes throughout lifetime.

What makes it an admirable read is that every claim is backed up with tests and results. The prenatal handled rat profile is guessed not to be genetic and *”**as evidence**, crossfostering neonates of low-LG-ABN mothers (one standard deviation below the mean) to high-LG-ABN ones (or the reverse) produces adults with the profile associated with the adoptive, rather than the biological, mothering style.”* Furthermore, the authors accept that the the effect of drugs to produce high LG-ABN nurtured rat profiles must also be tested in the other direction and *”work must be done... : it **must be shown** whether the behavioral consequences of having been raised by a low LG-ABN mother are also shifted by this pharmacological intervention.”* They accept their presumption giving certain drugs for inhibiting histone deacetylation which had the impact of transforming rats raised in a low LG-ABN environment to a profile of those raised in high LG-ABN, must be correlated with altered chromatin structure and methylation state of the genes around the site of interest must impact glucocorticoid receptor gene, *”However, although the authors have not yet demonstrated”.* Lastly, their mentioning that *”**understanding the neurobiological mechanisms of intervention remains a vital challenge**”* sets out the scientific spirit of not knowing.

On being unreasonable for personal reasons in sciences...

by Vaibhav Arora

The nature vs nurture debate is a long standing and important one to understand individual behavior throughout his or her lifetime. One might not be interested in the related academia, research, historic or legal implications but the topic is in the interest of any and all individuals to 'know thyself' and such is the case leading to people of all backgrounds tinkering with the topic in one manner or another at all levels. It is then fair to say that the published research and literature relevant to the topic can have outreaching and outlasting impact, much beyond the authors of such research might be able to acknowledge.

Having said that, today, with all the technological advances, it has well been established that it is not all genetic, nor is it all environmental, but we talk about gene-environment interaction. Therefore, as a layman on the matter, not claiming any authority whatsoever, one can then only be critical of the findings of the paper within the context of their writing and present day knowledge.

Now, the two papers discussed were published almost a century apart, both coming from different backgrounds, Watson from psychology and Sapolsky and the authors of the studies he discusses from a biology and neuroscience background. Watson established evidence in support of the nurture argument. Sapolsky reaffirms the gene-environment interaction. As mentioned before, the latter is held to be true today. Given that bit, one can then move onto judge the findings of the first author.

Personally, I feel behavioural studies and psychology are blackbox studies of biology and neurosciences and they exist only to explain at high level what we don't understand at biological levels. Keeping that bias aside, Watson was an authoritative figure in his field at the time. And really keeping everything aside, if I were to read his paper back in 1920s, I would be convinced that early-childhood nurture and that only can have irreversible behavioral conditioning. I am only able to pick out his sentences that are questionable as far as scientific methodology goes because I began reading his paper with a prior knowledge of gene-environment interaction. But even then there doesn't seem to be a room for excuse for not being unsure at the least, not questioning ones findings at all and pushing forward ones ideas and challenging authorities without any hint of doubt, based on inadequate and incomplete experiments. Of this, all readers of the paper, irregardless of the year of reading, would agree.

It was a disruptive study of the time no doubt, challenging Freud, and establishing Behaviorism. But in the end, it turned out to be so because of the methods deployed and the way the study was pushed forward (experimentation on a child, challenging Freudian ideas, no exhibition of doubt) and not because its findings were really true and thus merit worthy, as we know today. This must be a problem in general in academia. Another grave issue that comes to mind in retrospect of the two papers is the problem that being an expert in one's own field, knowledge from other fields is ignored or rather turned a blind side to not exist at all.

That being said, I wonder if I would be tempted likewise to publish, trivial or non-trivial findings, for the sake of forwarding my career.

References

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